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A thermodynamically based definition of fast verses slow heating in secondary explosives BRYAN HENSON, LAURA SMILOWITZ, Los Alamos National Laboratory — The thermal response of energetic materials is often categorized according to the rate of heating as either fast or slow, *e.g.* slow cook-off. Such categorizations have most often followed some operational rationale, without a material based definition. We have spent several years demonstrating that for the energetic material octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) a single mechanism of thermal response reproduces times to ignition independent of rate or means of heating over the entire range of thermal response. HMX is unique in that bulk melting is rarely observed in either thermal ignition or combustion. We have recently discovered a means of expressing this mechanism for HMX in a reduced form applicable to many secondary explosives. We will show that with this mechanism a natural definition of fast versus slow rates of heating emerges, related to the rate of melting, and we use this to illustrate why HMX does not exhibit melting, and why a number of other secondary explosives do, and require the two separate categories.

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